an adjustable impedance network disposed on the substrate and coupled to the light emitting circuit; and

circuitry for adjusting a slope efficiency of the light emitting component.

REMARKS

Claims 1-26 and 39-42 and 44-48 are pending in the application.

Applicant notes with appreciation that the Examiner has indicated that claims 39-42 contain subject matter allowable over the prior art.

Claims 1-26 and 43-47 are rejected under 35 U.S.C. § 102(b) as being unpatentable over Lim et al. U.S. patent 6,026,108 (hereinafter "Lim").

Claims 35-38 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Lim.

Reconsideration of this application in view of the following remarks is respectfully requested.

Applicant's Reply to the
Rejections Under 35 U.S.C. § 102(b)

The Examiner rejected claims 1-34 and 43-47 under 35 U.S.C. § 102(b) as being unpatentable over Lim. In particular, the Examiner rejected claim 27* contending that

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* In the Office Action, claim 26 is rejected for the reasons
(continued...)

Lim discloses a light emitting element 20 disposed on a substrate 22 with an impedance network (50Ω,C,L) also disposed on the substrate and coupled to the light emitting element (Office Action, pages 2 and 3).

Applicant has withdrawn claims 27-38 and 43 from consideration. Thus, only claims 1-26, 39-42, and 44-48 remain in the case. Applicant has amended claim 39-42 as suggested by the Examiner and therefore those claims are in a condition for allowance. Accordingly, only claims 1-26 and 44-48 require further consideration.

The Examiner, however, has failed to provide any reasons justifying the rejection of claims 1-26 and 44-48 or explain why applicant's remarks regarding the allowability of these claims is not persuasive. The undersigned called Examiner Vu to clarify the rejection on July 16, 2003. During that conversation, the Examiner could not explain why claims 1-26 and 44-48 were not allowable over the prior art of record. The Examiner did mention that a new reference, U.S. Patent 5,497,102 to Burrows et al. was believed to show some of the claimed features. Applicant disagrees. The Burrows patent is directed toward a system and method for detecting flamable liquids and is not at all related to the light emitting components recited in applicant's claims. Nonetheless,

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* (...continued)
stated above. However, applicant believes the Examiner intended to reject claim 27 instead as all of the rejected features appear in claim 27 and not in claim 26.

applicant again provides a discussion explaining why claims 1-26 and 44-48 are allowable over the prior art of record including Lim and Burrows. In light of the discussion below, applicant respectfully requests allowance of this application including claims 1-26 and 44-48.

Light emitting elements such as vertical cavity surface emitting lasers (VCSELs) and the like are used today in a wide variety of electronic applications. Common examples of products that employ light emitting elements include DVD players and high speed optical communications systems. The role of light emitting elements often involves the generation of light pulses for acquiring or transmitting data. To function in this capacity, driver circuitry is used to supply the appropriate electrical differential across the light emitting element to generate digital optical signals.

Many light emitting elements, however, are fabricated with varying impedance values. A VCSEL, for example, typically has an impedance value that varies between about 17-50 Ohms. This variation poses problems for driver circuitry because of the likely impedance mismatch that results between the output of the driver circuitry and the input of the VCSEL. Foremost among these problems are the signal reflections that occur along the transmission line between the driver circuit and the VCSEL that reduce signal quality and limit response time.

In the past, this problem has been dealt with by manipulating the operating characteristics of the driver circuitry. One popular solution, for example, includes the addition of external termination components that absorb reflected energy. This solution is not optimal because it requires system manufacturers to determine the impedance of each light emitting element individually and couple the appropriate compensation components to the driver circuitry. Other popular solutions include the use of precision driver modules that can accommodate an impedance mismatch without losing significant performance. Such systems, however, inevitably sacrifice certain amounts of bandwidth and frequency response.

Applicant's claimed invention solves these and other problems by disposing both an adjustable impedance network and a light emitting element on the same integrated circuit substrate. This arrangement normalizes the impedance of the overall light emitting circuit which reduces or eliminates the need for external damping components and specialized driver circuitry. Thus, using applicants claimed invention, system designers may achieve superior performance using inexpensive, mainstream driver circuits, often without the use of cumbersome external damping networks.

Independent claims 1 and 15-17 claim some of the improvements of applicant's invention mentioned above. For

example, claim 1 specifies adjusting the impedance of an adjustable impedance circuit so that the equivalent impedance of a light emitting component is set to a predetermined value. As stated above, this arrangement normalizes the impedance of the overall light emitting circuit which reduces or eliminates the need for external damping components and specialized driver circuitry. Claims 15 and 16 specify adjusting the impedance of the adjustable impedance circuit so that the equivalent impedance of the light emitting component matches the characteristic of a transmission line (claim 15) or matches the output impedance of a driver circuit (claim 16). These claimed light emitting elements eliminate or reduce the need for external damping components and specialized driver circuitry and allow end-item users to achieve superior performance using inexpensive mainstream driver circuits. This represents a vast improvement over the prior art.

Moreover, claim 17 specifies a light emitting element that includes a variable transfer function network wherein the trasnfer function may be adjusted to obtain a desired frequency response from the light emitting element. This arrangement provides both the manufacturer and end user with the capability to optimize various performance characteristics of the light emitting element such as

bandwidth and high frequency response. Claims 44-48 are allowable for similar reasons.

Lim, on other hand, does not show or suggest these features anywhere. Nor has the Examiner provided any specific reasons in the last two Office Actions why these claims are not allowable (discussed in more detail below). Accordingly, applicant respectfully submits claims 1-26 and 44-48 are in a condition for allowance.

Burrows

The Examiner has suggested that Burrows may disclose some aspects of the claimed invention. Applicant disagrees. Burrows merely discloses a system that measures the dielectric properties of a liquid inside a sealed container to determine if the contents are flammable. This has absolutely nothing to do with circuits or methods improving the performance of light emitting elements. Applicant believes this reference is not at all relevant to the claimed invention.

The Examiner Has Not Responded
To Any of Applicant's Arguments

As a general rule, the Examiner is required to respond to all arguments made by an applicant attempting to secure allowance of claims pending in an application (see MPEP § 707.07(f)). Otherwise, the claims may be considered allowable if applicant's arguments remain unchallenged (see

In re Herrmann, 120 USPQ 182 (CCPA 1958) and *In re Soni* 34 USPQ2d 1684, 1688 (Fed. Cir. 1995)).

In the March 7, 2003 Reply, applicant presented arguments explaining why all the claims (1-48) were allowable over the prior art. Nonetheless, in the Final Office Action dated June 20, 2003, the Examiner failed to respond to any of those arguments and merely re-presented the rejections of the previous Office Action along with a single sentence response directed toward only some of the claims (27-43) that clearly demonstrates none of applicant's arguments were seriously considered. The following discussion demonstrates the non-responsiveness of the Examiner's recent Office Action.

Claims 1-26 and 44-48

The Examiner originally rejected claims 1-25 and 43-47 in the Office Action of February 13, 2003 over Lim contending that "[c]laims 1-25 and 43-47, the method steps are necessitated by the device of Lim" (Office Action, page 3).

Applicant responded in the Reply of March 7, 2003 stating that "Claims 1-26 and 44-47 are further allowable over the prior art because these claims specify adjusting a characteristic of the impedance circuit such as transfer function or overall impedance to obtain a desired circuit attribute such as predetermined impedance (claim 1), impedance matching (claims 15 and 16), and desired frequency

or optical response (claim 17 and 44 respectively). None of these features are shown or suggested by the prior art" (Reply pages 6-7).

In the Final Office Action of June 20th, the Examiner merely restated the original rejection without addressing applicant's arguments at all. Accordingly, applicant believes for the reasons stated above that claims 1-26 and 44-48 are in a condition for allowance unless the Examiner provides a credible explanation as to why applicant's arguments are not persuasive.

Claims 27-34

The Examiner originally rejected claims 26-34 in the Office Action of February 13, 2003 over Lim contending that, among other things, "[L]im discloses a light emitting element comprising ... an impedance network ... disposed on a substrate (22)" (Office Action, page 2).

Applicant responded in the Reply of March 7, 2003 stating, among other things, that:

> "The impedance components shown FIGS. 20, 21 and 31 of Lim *are all external components* that are not present on VCSEL substrate 22. This is true for several reasons. First, the none of the components shown in *FIG. 20 are disposed on a substrate* other than device 130 (Lim FIG. 19 and col. 11, lines 9-42). This includes the potentiometer and other bias circuitry shown in FIG. 20. Moreover, the size of the components described by Lim are far too large to be placed on an integrated circuit. For example, the 0.2μF capacitor described at column 15, lines 28-29 would require approximately 200 mm^2 of die space using a typical fabrication process. This is about the size of the entire surface area of

> the largest chips currently manufactured. Moreover, the 10H inductor described at column 15, line 28, is about eight orders of magnitude (*i.e.*, one hundred million times) larger than a typical chip-based inductor and would require at least several square feet of die space to construct, and thus is much too large for placement on a semiconductor die" (Reply, page 5, emphasis added).

In the Final Office Action of June 20th, the Examiner ignored this argument completely and did not explain why the alleged impedance network was indeed on the substrate contrary to applicant's assertion. Accordingly, because Lim does not show or suggest a substrate-based impedance network and because the Examiner has failed to explain why applicant's arguments are not persausive, claim 27 and the claims that depend therefrom are allowable. The **only reason** applicant has withdrawn these claims is to narrow the issues for appeal. No estoppel under *Hilton Davis* or any other type of prosecution history or file wrapper estoppel should be inferred by this course of action. The subject matter of claims 27-34 will be persued in a continuation application.

Applicant's Reply to the
Rejections Under 35 U.S.C. § 103(a)

The Examiner rejected claims 35-38 under 35 U.S.C. § 103(a) as being unpatentable over Lim. These claims, if not withdrawn, would be allowable over the prior art for at least the reasons stated above.

Conclusion

The foregoing demonstrates that claims 1-26, 39-42 and 44-48 are allowable. Reconsideration and a favorable action are respectfully requested.

Respectfully submitted,

Michael E. Shanahan
Registration No. 43,914
Attorney for Applicant
Customer Number 1473
c/o Fish & Neave
1251 Avenue of the Americas
New York, NY 10020-1104
Tel.: (212)-596-9025

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July 21, 2003

Lillian Garcia

Signature of Person Signing

Appendix

39. (Amended) A light emitting component comprising:

a light emitting element disposed on a substrate for emitting light; and

an adjustable impedance network disposed on the substrate and coupled to the light emitting circuit wherein the adjustable impedance network is adjustable at the optical subassembly level.

40. (Amended) A light emitting component comprising:

a light emitting element disposed on a substrate for emitting light; [and]

an adjustable impedance network disposed on the substrate and coupled to the light emitting circuit; and

circuitry for establishing a current threshold of the light emitting component.

41. (Amended) A light emitting component comprising:

a light emitting element disposed on a substrate for emitting light; [and]

an adjustable impedance network disposed on the substrate and coupled to the light emitting circuit; and

circuitry for adjusting a current threshold of the light emitting component.

42. (Amended) A light emitting component comprising:

a light emitting element disposed on a substrate for emitting light; [and]

an adjustable impedance network disposed on the substrate and coupled to the light emitting circuit; and

circuitry for adjusting a slope efficiency of the light emitting component.